*Jennifer Stock:* This past September of 2007, Captain Charles Moore, founder of the Algalita Marine Research Foundation and a crew of five set out to the north Pacific gyre area known as the eastern garbage patch in the Pacific Ocean. They collected samples to assess if the gyre is growing an abundance of plastic. Charlie is joining me today from Hawaii where the most environmentally-friendly ocean vessel, Algita, is in port after its voyage across from California. Thank you, Charlie, for spending some time with us today.

*Charles Moore:* Oh, nice to be with you again, Jennifer.

*Jennifer Stock:* So, the garbage patch sampling that has taken place took place in 1999, 2005, and just recently in September. Your previous findings of plastic outweighing plankton six to one likely is a statistic that could change. What were you expecting to find on this expedition? Does it appear to have worsened?

*Charles Moore:* Yes it does and it's not by a trivial amount and what we also did on this voyage was, kind of, leave what's defined as the garbage patch, this area halfway between San Francisco and Hawaii, and go on what Dave Foley of NOAA, who's been working on derelict fishing nets, calls the superhighway between the western garbage patch and the eastern garbage patch and that's where he's found most of these ghost nets to be accumulating.

He just published a paper in Marine Pollution Bulletin giving a daily index, debris estimated likely an index for the month of March of where, you know, based on flyovers that they did and current diagrams and a lot of other oceanographic parameters, they determined that the convergence of this debris might be. So, on our voyage over we were in contact with Dave and guided us to an area where they apparently believe the forces that bring the nets together also bring nutrients and cause these phytoplankton blooms. So, you can see those from the satellite and he guided us to one of these blooms to get water samples for him and on the way there outside the garbage patch north of Hawaii, we found the highest levels ever of plastic in the ocean. So, it may be that the superhighway between the garbage patches is actually more polluted than the garbage patches themselves.

*Jennifer Stock:* So, these convergent zones are accumulating ghost fishing nets and plastic, but are also maybe areas of high productivity for food production in the ocean maybe attracting predators.

*Charles Moore:* Yeah. It's not a pretty picture. We had thought that these oceanic deserts were isolated phenomenon in the sense that, yeah, there's a lot of plastic there, but there's not much life there either, but on this trip we were late in the season. So, we actually saw humpback whales migrating through the garbage patch on their way to Hawaii from Alaska and we saw the mola molas out there feeding on the jellies, the ocean sunfish, and we saw a lot of black-footed albatross, more than we'd ever seen before in a group on the water and the idea that the forces that bring the debris together and make it converge on a zone, those forces also bring the nutrients that would cause the food chain in the ocean to develop.

It's somewhat alarming because, you know, we had thought we were dealing with an area which accumulated most of the debris and where there was little life. Now we're finding that areas, high-impact areas, like the Northwest Hawaiian Islands National Monument now are right in the target range of this superhighway connecting the two gyres. So, Foley says we need to think about the gyres. The garbage patch is this kind of compressor sucking up this debris, but then spitting it out on this superhighway that goes between the two of them. So, now we have another area to examine. We're going to do that on our return trip here on January 21st and through February 20th and we're going to go farther west, closer to the international dateline and west of the garbage patch to see if this high debris level can be confirmed with subsequent samplings.

*Jennifer Stock:* So, you'll be doing more manta tows? I noticed on your blog, which is very informative and great to keep up with, that you were doing deep tows as well with some nets. Was there a difference in plastic caught at depth versus the surface?

*Charles Moore:* Oh, yes. There was no question, but what...the amount of plastic debris decreases with depth. Although, it may be that it increases again when you reach the bottom. I mean, yes, we've done the deepest bongo trawl ever down to 100 meters, we wanted to determine how much plastic was in the mixed layer of the ocean, which goes down to about 100 meters. So, if we could, say, give an assessment of how much plastic is in the mixed layer, that would be a very interesting number and, you know, it's getting to the point where we really have to be careful about what we say because we're getting quoted and we don't know a lot of the answers to these questions; How much is there?

Dr. Evesmeyer proposed to me that we calculate the surface area covered by these bits of plastic and how much sunlight is being blocked by them.

*Jennifer Stock:* Oh, interesting.

*Charles Moore:* It's an important thing to know too. So, we're working on that, but I was reading an article by a submersible diver here in Hawaii that's been to many, many parts of the ocean bottom and he says every single dive he finds trash on the bottom. Doesn't matter what depth, how deep he is, he finds debris on every dive. So, that's an alarming finding. Although, it's anecdotal it's alarming to know that someone who, you know, goes to the bottom of the ocean is finding all this trash. So, yeah, there's a lot on the surface, there's a lot on the bottom and then, you know, there's lesser amounts in between, but, you know, obviously if its getting from the surface to the bottom it's in the water column at some point. So, these are things that are extremely complex and I can't give you a number on how much is there, but these are the kinds of things we want to try to understand.

*Jennifer Stock:* So, you'll be analyzing samples when you come back to land in California?

*Charles Moore:* Yeah, we're...actually, I'll be sending some over from University of Hawaii-Hilo where they have a hood where we can drain the formaldehyde off and rinse the samples and then I can set them in just a light water pack by U.S. mail to the mainland and our lab can begin analyzing them early next month.

*Jennifer Stock:* So, it seems interesting that perhaps maybe a new finding this cruise is that there's plastic accumulating along these frontal zones and there's also high productivity there. Is this somewhat new as far as...

*Charles Moore:* Yeah, we...this was something that Foley was excited to...he really wanted to know if I thought that there was more debris in the area where this plankton bloom was occurring and I have to say that there was. It was the most I'd ever seen in any one single trawl was right near where this bloom was occurring. So, and also, the folks we had filming on board for MTV were really wanting to see, you know, a bunch of garbage. They wanted to film it and they were on deck for half an hour just filming one piece of garbage after another passing by. So, they were kind of disappointed in the so-called garbage patch because it wasn't something that was one

piece of debris right after another. There was plenty of debris, but it was, you know, intervals in between.

*Jennifer Stock:* Sporadic. So, how do you think these recent studies are going to help your foundation to continue to work with legislators and Congressionals to try to reduce this plastic input into the ocean?

*Charles Moore:* Well, I think that, you know, we've kicked off an international movement here. Rebecca Hoskings over in UK got her town, Modbury, to ban plastic bags and that caught on like wildfire and now the mayor of London and the new Prime Minister have embraced her campaign and I was just on Irish radio with Dr. Thompson who does similar work to what we do in the Atlantic and around the British Isles and when we're talking online on this radio program in Ireland, we were discussing, you know, the need for industry to step up to the plate with incentives to make plastic simpler, to make the codes more understandable, to make the infrastructure to take it back, and, you know, to create producer responsibility.

So, without some form of producer responsibility and some cooperation of industry trying to create products that are easy to recycle and have an infrastructure and a value so that people can basically be paid for their discards like they are with the bottle bill, which is fairly...I mean, the only thing that's really kept any plastic out of the ocean at all is the bottle bills and until every piece of plastic has a value like a bottle, I think we're going to see increases in the levels.

*Jennifer Stock:* Are you talking about the five cent tax on each bottle or can you explain?

*Charles Moore:* Yeah, there's a "High Five Hawaii." When they started that they think they got back about 60 percent of the bottles, you know. So, that's a start, but we hear, you know, we have the bottle caps being a different kind of plastic than the bottle and not being taken back through these bottle bills. So, when you think the bottle bill is taking care of the bottle problem, it's certainly not dealt with the bottle cap problem and that's what most of these albatross are eating, the bottle caps, and we find bird stomachs full of these bottle caps, an incredible amount of bottle caps out there on...just one 300 meter stretch of my beach in Long Beach on the Long Beach peninsula, we found 1,100 bottle caps on Earth Day. I set up a table on coastal cleanup day and offered kids five cents a piece if they would separately collect bottle caps for me and I got 1,100.

I was going to spend a few bucks, but I ended up spending 60 bucks.

*Jennifer Stock:* Oh, boy. Good incentive. It's too bad that we have to incent folks with money, but it was probably fun for the kids.

*Charles Moore:* Well, that just shows you. If you have a nickel for the bottle and a nickel for the cap, you're going to get them back.

*Jennifer Stock:* Yeah.

*Charles Moore:* If it's just a nickel for the bottle and nothing for the cap, the caps end up in the ocean.

*Jennifer Stock:* Well, I want to thank you very much for all the passion that you're bringing to this issue and the outpouring of outreach you're doing with the foundation because I really think it is catching on to the larger media that there's this huge problem on our planet and our oceans with plastic and human health being directly attached to it. So, thank you very much for your time today.

*Charles Moore:* Well, I'm very pleased to be with you and, yeah, I'm hopeful that we don't create a shade cloth over the surface of the ocean with all of this. That, if it's unchecked, that will be the result. We'll be shadening the entire ocean with a plastic cloth. Even though it's not stitched together, those particles will be creating a kind of shade that will really interfere with carbon sequestration in the ocean. So, I think we've got...we better call Al Gore and tell him to get on the plastic bandwagon if he wants to stop global warming. Very good!

*Jennifer Stock:* Thanks so much, Charlie. It's great to hear your voice.

*Charles Moore:* Yeah, you too.

*Jennifer Stock:* Have a safe voyage.

*Charles Moore:* Keep up the good work.

*Jennifer Stock:* Take care.